APPENDIX A

Record of Decision

RECORD OF DECISION

HASTINGS GROUNDWATER
CONTAMINATION SITE
FAR-MAR-CO SUBSITE
OU 6
HASTINGS, NEBRASKA

PREPARED BY:

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION VII
KANSAS CITY, KANSAS

SEPTEMBER 2007

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Hastings Groundwater Contamination Site
FAR-MAR-CO Subsite
Hastings, Nebraska
CERCLIS ID No. N4D980862668

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedy for Operable Unit 6 (OU 6) of the FAR-MAR-CO Subsite (Subsite), Hastings Groundwater Contamination Site (Site), located in Hastings, Nebraska. The remedy has been chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, 42 U.S.C. § 9601 *et seq.*, and the National Contingency Plan, 40 CFR Part 300. This decision is based on the Administrative Record for OU 6 of the Subsite.

The state of Nebraska concurs with the selected remedy.

ASSESSMENT OF THE SUBSITE

The response action selected in this ROD is necessary to protect the public health and welfare or the environment from actual or threatened releases of hazardous substances, pollutants, and/or contaminants into the environment from OU 6 which may present an imminent and substantial endangerment.

DESCRIPTION OF THE REMEDY

The selected remedy is intended to be the final response action for the Subsite and addresses all contamination associated with the principal threats posed by the Subsite OU 6. Specifically, the selected remedy addresses volatile organic compound (VOC) contamination identified in the ground water at the Subsite.

The major components of the selected remedy include:

- Ground Water Extraction at Well D, Chief Ethanol and the Whelan Energy Center (WEC) – Treatment of the extracted water is provided in its use as non-contact cooling water or in other industrial processes.
- Enhanced In Situ Bioremediation in Source Area – A single injection well will be installed upgradient of MW-8, in the source area for carbon tetrachloride (CT) and ethylene dibromide (EDB) contamination. A nutrient-rich solution will be injected for the purposes of altering the ground water geochemical environment to enhance reductive dehalogenation of CT and EDB.

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with federal and state requirements that are applicable or relevant and appropriate to the remedial action, is cost-effective, and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable. This remedy also satisfies the statutory preference for treatment as a principle element of the remedy.

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five years after initiation of the remedial action to ensure that the remedy is or will be protective of human health and the environment.

ROD DATA CERTIFICATION CHECKLIST

The following information is included in the Decision Summary section of this ROD. Additional information can be found in the Administrative Record for this Site.

- Contaminants of concern (COCs) and their respective concentrations (Sections V and VII).
- Baseline risk represented by the COCs (Section VII).
- Cleanup levels established for COCs and the basis for these levels (Section VIII).
- How source materials constituting principal threats are addressed (Sections XI and XIII).
- Current and reasonably anticipated future land use assumptions and current and potential beneficial uses of ground water used in the baseline risk assessment and ROD (Section VI).
- Potential land and ground water use that will be available at the Subsite as a result of the selected remedy (Section XII).
- Estimated capital, annual operation and maintenance, and total present-worth costs, discount rate, and the number of years over which the remedy cost estimates are projected (Section XII).
- Key factor(s) that led to selecting the remedy (Sections X and XIII).

AUTHORIZING SIGNATURE

Cecilia Tapia, Director
Superfund Division

9/7/07
Date

RECORD OF DECISION

DECISION SUMMARY

HASTINGS GROUNDWATER
CONTAMINATION SITE
FAR-MAR-CO SUBSITE
HASTINGS, NEBRASKA

PREPARED BY:

U.S. ENVIRONMENTAL PROTECTION AGENCY
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SEPTEMBER 2007

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SECTION I. SITE AND SUBSITE NAME, LOCATION, AND DESCRIPTION

The Hastings Groundwater Contamination Site (Site) is located primarily in Adams County, Nebraska, and covers the central industrial area of the city of Hastings and adjacent areas outside of the city limits. The U.S. Environmental Protection Agency (EPA) and the Nebraska Department of Environmental Quality (NDEQ) identified the Site as a hazardous site requiring management within the respective federal and state programs known as Superfund. The federal Superfund law is the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA), 42 U.S.C. § § 9601 *et seq.* In 1986, the Site was listed on the National Priorities List (NPL). EPA identification number assigned to this Site, N4D980862668, is utilized in EPA's electronic database known as the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS III).

The FAR-MAR-CO Subsite (Subsite) is one of the seven subsites that constitute the Site. The Subsite is located on the north side of Highway 6 on the eastern edge of Hastings, as shown on Figures 1 and 2 The Subsite covers about 70 acres in an industrial area which has been used for storage and handling of agricultural products for more than 50 years. Within the Subsite are grain elevators, warehouses, and other buildings used for grain storage and distribution.

As a Superfund project, the Subsite was divided into three operable units (OUs): (1) OU 3 addressed the contaminated soils and source materials which were remediated by Farmland Industries, Inc., pursuant to a 1997 Consent Decree; (2) OU 11 addressed soils contaminated with 1,1,1-trichloroethane (TCA) which were cleaned up by Hastings Irrigation Pipe Company pursuant to a December 1989 Administrative Order on Consent (Consent Order); and (3) OU 6 addresses the contaminated ground water associated with the Subsite. The focus of this Record of Decision (ROD) is OU 6.

SECTION II. SUBSITE HISTORY AND ENFORCEMENT ACTIVITIES

Morrison-Quirk Grain Corporation (Morrison-Quirk) owned the Subsite from 1953 to 1975. During this period, it used a liquid grain fumigant containing carbon tetrachloride (CT) and ethylene dibromide (EDB). In 1959, a grain dust explosion occurred, causing the release of nearly 1,000 pounds of liquid grain fumigant. FAR-MAR-CO, Inc., purchased the property in 1975. FAR-MAR-CO and its successor, Farmland Industries, Inc. (Farmland) used or stored grain fumigant containing CT and may have used EDB. The property was acquired by Cooperative Producers, Inc., the current owner, in 1991 and is operated as a grain storage facility.

After the city of Hastings and the state of Nebraska identified ground water contamination in the city water supply, EPA initiated a ground water investigation and in 1985 began work at the Subsite. EPA found both EDB and CT in on-site ground water at levels above their Maximum Contaminant Levels (MCLs). Other chlorinated solvents including trichloroethylene (TCE) were also detected. Morrison Enterprises (Morrison), successor to Morrison-Quirk, initiated a Remedial Investigation/Feasibility Study (RI/FS) for the ground water operable unit (OU 06) in 1992 pursuant to a Consent Order. As part of the RI/FS, Morrison prepared a draft RI Report and a draft Focused FS Report in 1993. In addition, Morrison prepared an Engineering Evaluation/Cost Analysis (EE/CA) in 1995, which provided a streamlined analysis of the nature and extent of ground water contamination.

During site investigations, EPA learned that two Community Municipal Services, Inc. (CMS) wells downgradient of the Subsite were contaminated with CT and EDB. Only one well from the CMS system (CMS-19, which was not contaminated) remained in use.

In response to this threat to the users who relied on CMS for drinking water, EPA sought the cooperation of Morrison to prevent migration of the FAR-MAR-CO plume to CMS-19. In 1996, Morrison entered into a Consent Order to perform a ground water removal action as a short-term measure. Morrison installed Well D (EW-1) downgradient of the Subsite to extract contaminated ground water, and, in July 1997, began pumping water from Well D to the Whelan Energy Center (WEC), where it is used in part as non-contact cooling water. Following its use, the cooling water containing volatile organic compounds (VOCs) passes through a cooling tower, transferring these compounds to the air (air discharges must meet the WEC's Air Permit requirements). Unvaporized water is discharged to the surge pond. A smaller volume of the water is also used in other industrial processes (disposal of fly ash, bottom ash, and generation of steam) and is discharged to WEC's fly-ash pond or in the chemical waste water lagoon. A smaller volume yet is used to cool critical bearing assemblies. The process of this action agitates the water and causes volatilization. This water goes into floor drains, and into either the sewer (storm and sanitary) or the neutralization pond. VOCs in excess of MCLs, have been detected in analyses of water from the discharge pipe into the ash ponds. Analyses of water in the pond itself and in associated shallow monitoring wells have not shown concentrations exceeding the MCL for VOCs, indicating that dilution, agitation, and volatilization occur when the water enters the pond.

The ground water removal action is comprised of a primary containment zone, an area of ground water flow controlled by Well D, and a secondary containment zone created by the pumping of industrial wells IN-11 and IN-05. In practice, a tertiary containment zone is also present, due to the pumping of WEC wells A, B, and C. The water pumped from these wells, like that from Well D, is used at the WEC as non-contact cooling water and in other industrial processes as described above. Figure 2 shows the location of Well D, WEC, and wells in the area.

Water pumped from Wells IN-05 and IN-11 at the Chief Ethanol plant is used as cooling water, boiler water, and process water for ethanol production, cleaning, washdowns, and maintenance. A portion of the pumped ground water is treated through reverse osmosis and used for boiler water and for some cooling water. The untreated portion is also used as cooling water and in addition, for process water for ethanol production, cleaning, washdowns, and maintenance. Once the ethanol is created, the remaining corn mash, which is a by-product, is decanted and sold as livestock feed. The decanted water is evaporated to concentrate solids to be sold as syrup. The water vapor is condensed to create condensate that is recycled back to the process or treated in the waste water treatment system. Cooling tower blowdown and process water from equipment, cleaning, washdowns, and maintenance are treated on-site. Any VOCs pumped from the ground water would be volatilized by this entire process. All process treated waste water, reverse osmosis blowdown, and boiler blowdown is discharged to the West Fork of the Big Blue River, by permit.

EPA set the Performance Standards for the removal action at levels corresponding to 1×10^{-4} risk level for CT and TCE, and the MCL for EDB (as the 1×10^{-4} risk level for EDB is more stringent than its MCL.). For this final remedial action, Performance Standards (or water quality goals) are based on the Nebraska Ground Water Quality Standards (Title 118), which are equivalent to MCLs.

In 2002, Morrison submitted the Well D Report, which summarized the first five years of Well D operation. After EPA reviewed the Well D Report, Morrison was asked to complete the FS for long-term ground water action. Morrison agreed and entered into a Consent Order in 2005. The final version of the FS was submitted in December 2006, with an addendum submitted in June 2007. Following a final addendum by EPA, the FS was approved in June 2007. In conjunction with the Well D pumping program initiated in 1997, some sampling has occurred to address specific issues of concern to EPA and Morrison. For example, in 2004, Morrison performed multi-level sampling of well MW-8 to investigate the stratification of contamination in the aquifer.

While the ground water removal action was underway, in 1999, the city of Hastings extended a city water supply line east of the Subsite and began providing drinking water to the affected users of the CMS water system. This action prevented potential human exposure through the public drinking water system.

Contamination of soil in the source area of the Subsite (OU 03) was addressed separately by Farmland and Cooperative Producers, Inc., pursuant to a Consent Decree. In accordance with the ROD for OU 03, this action addressed soil contamination and soil gas containing EDB and CT. A soil vapor extraction (SVE) pilot test was conducted in 1990, removing a total of 354 pounds of EDB, 634 pounds of CT, and 74 pounds of other VOCs. The full scale SVE system was installed in 1997 and operated until 2002. An additional 422 pounds of EDB and 308 pounds of CT were removed during its operation period. Based on the mass of contaminants removed by SVE, EPA believes that significant additional mass of contamination was released from the Subsite subsequent to the 1959 explosion.

SECTION III. COMMUNITY PARTICIPATION

Recent Activities at the Subsite

EPA released the Proposed Plan for OU 6 to the public on July 9, 2007, and made available for public review the Administrative Record, which included the RI and FS Reports, the FS Addendum, and the Proposed Plan, at the information repositories maintained at the Hastings Public Library and the EPA Region 7 Records Center located in Kansas City, Kansas. The notice of availability for these documents was published in the Hastings Tribune on July 9, 2007. The public comment period on these documents continued for 30 days, from July 9 to August 9, 2007.

A public meeting was convened by EPA on July 18, 2007, in the Hastings Public Library. Fact Sheets were sent to citizens of Hastings which advised of the opportunity to hear a summary of the Proposed Plan and provide comments or ask questions concerning the investigations or remedial alternatives. A transcript of the public meeting is available with the Administrative Record in the Hastings Public Library. At this meeting, EPA representatives answered questions about the Subsite conditions, the remedial process, and the Proposed Plan. EPA response to the comments received during the public comment period is included in the Responsiveness Summary which is attached to this ROD. In summary, with the issuance of this ROD, all the public participation requirements as defined in CERCLA Sections 113(k)(2)(B)(i-v) and 117 and 40 CFR § 300.430(f)(3) have been satisfied.

Historical Activities at the Site

During the RI/FS process, EPA solicited a wide cross-section of community input on the reasonably anticipated future land use and potential beneficial ground water uses at the Site. Efforts to address this issue included community interviews during the development of the Community Involvement Plan (July 2002), multiple meetings with City officials in the Public Works organization and committee, and the public meeting.

SECTION IV. SCOPE AND ROLE OF RESPONSE ACTION

This ROD addresses EDB and CT contamination of ground water at the Subsite. Exposure to ground water at OU 6 poses a potential future risk to human health because EPA's acceptable risk range is exceeded, and concentrations of contaminants are greater than the risk-based levels for these contaminants. This ROD presents the final response action anticipated by EPA for the Subsite.

SECTION V. SITE AND SUBSITE CHARACTERISTICS

The RI consists of a body of information compiled between 1987 and 2005. The FS analyses of data and reports were completed in July 2006. Together the RI and the FS provided information regarding the horizontal and vertical extent of the OU 6 ground water contamination, evaluated the corresponding risks to human health and the environment, and developed methods to address the contamination. The following subsections summarize the results and conclusions developed during the RI and the FS:

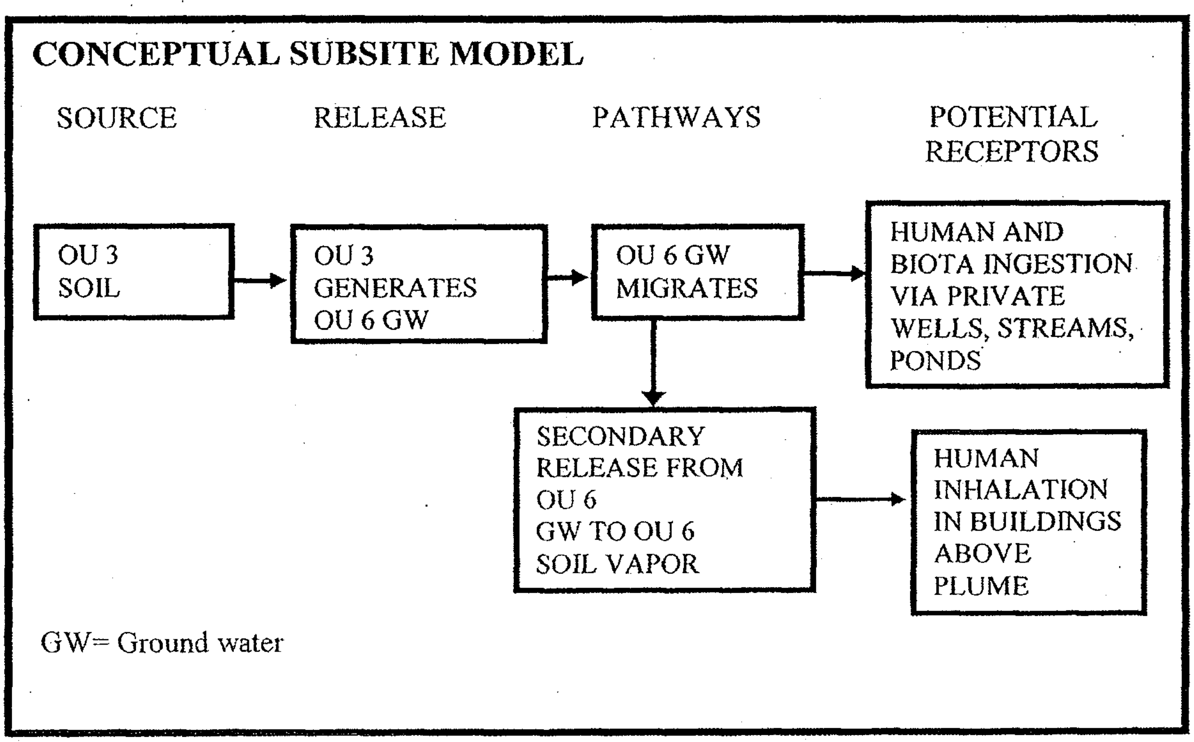
OVERVIEW OF OU 6

The Subsite is located in an area comprised primarily of mixed industrial, commercial, and residential uses in the Loess Plains of the Great Plains physiographic province. The Subsite occupies approximately 70 acres on the eastern edge of Hastings, Nebraska. It is bound by the Burlington Northern Santa Fe (BNSF) Railway to the north and northwest and Highway 6 to the south. Showboat Road is to the east of the Subsite and commercial properties, including the North Landfill, are to the west.

Surface water features in the Hastings area include perennial and intermittent streams, wetlands, and artificial impoundments. Hastings lies on the surface water divide between south - to southeastward - flowing tributaries to the Little Blue River and north - to northeastward - flowing tributaries to West Fork Big Blue River. These tributaries are Big Sandy Creek, located southeast of Hastings; Pawnee Creek, flowing from the northwest to the southeast; and Thirty-two Mile Creek to the southwest. EPA has no data to indicate surface waters have become contaminated by EDB and CT, the OU 6 Chemicals of Concern (COCs).

CONCEPTUAL SUBSITE MODEL

The Conceptual Subsite Model describes the projected contaminant source(s), release mechanism(s), exposure pathway(s), and potential receptors for the Subsite. The sampling program, risk assessment, and response actions are based upon the Conceptual Subsite Model presented below.



SAMPLING STRATEGY

Subsite fieldwork was implemented in phases between 1985 and 2004. The focus of the fieldwork was characterization of the nature and extent of contamination resulting from grain fumigation operations. This was accomplished through sample collection from soil borings, soil-gas probes, SVE well borings, well borings, and an extraction well boring. Information on the geology of the Subsite came from work on remedial and removal work for this Subsite as well as for the Hastings Site overall.

GEOLOGIC AND HYDROGEOLOGIC RESULTS

- The stratigraphy includes several units: (1) The first is the Peoria Loess composed of a light brown to white eolian silt ranging from 10 to 40 feet in thickness and is disconformably separated from underlying units by the Sangamonian Interglacial hiatus. (2) The Loveland Loess, a reddish-brown calcareous silt with minor amounts of sand and clay. The formation ranges from 0 to 60 feet in thickness. (3) The Sappa Formation deposited during the Kansan Glacial Stage. Generally, the Sappa Formation consists of 50 feet of silt and fine-grained sand with a middle zone of fine to very coarse sand and gravel. The Sappa Formation is mostly sand west of the eastern City limits and mostly silt and clay east of the City limits. A volcanic ash layer (the Pearlette Ash Member) may occur at the bottom of the Formation. (4) A brownish-gray or gray silty clay, clayey silt, silt, or sandy silt containing lenses of sand overlie bedrock in large areas of western Clay and eastern Adams Counties. Boring logs indicate this deposit commonly floors the Pleistocene sediments in Hastings. (5) The Cretaceous-age Niobrara Formation disconformably underlies Pliocene/Pleistocene sediments in the Hastings area and is up to 300 feet thick. This Formation consists of yellow and light-to dark-gray chalky shale, limestone, and chalk. The shales of the Niobrara act as an effective aquiclude at the base of the overlying aquifer where the sands are deposited directly upon this formation.

- The regional aquifer in the vicinity of Hastings, informally known as the Pleistocene aquifer, occurs within sands and occasionally gravels and is located stratigraphically beneath the Sappa Formation. Across the Site, ground water is typically encountered at depths that range from 110 to 135 feet below ground surface (bgs). The aquifer extends to depths of about 200 to 220 feet bgs and the saturated thickness ranges from 65 feet on the western edge of the Site to approximately 100 feet to the southeast. Paleotopography developed on top of the Niobrara accounts for the variation in saturated thickness of the overlying Pleistocene aquifer. The aquifer is considered unconfined based on the location of the potentiometric surface relative to potential discontinuous confining zones or layers, and the response of the aquifer to pumping. The aquifer can yield large volumes (500 to more than 2000 gallons per minute [gpm]) of water to wells and is the principal source of drinking, irrigation, and industrial water in the Hastings area. The Pleistocene aquifer media consists predominantly of unconsolidated well-graded, medium-grained sands with some interbedded lenses of sandy gravel. In certain areas, a fine-grained layer (a silty clay) is found near the top of the aquifer (125 to 135 feet bgs).

- Water levels have been measured since 1934 in a U. S. Geological Survey recorder well located in the southwest portion of the Site. Measurements indicate that water levels have declined approximately 15 feet since the 1930s. In addition, a seasonal trend in water level fluctuation is evident with an approximate five-foot decline occurring during the summer months (due to irrigation) and recovery during the winter months. Hydraulic gradients typically range from 0.001 to 0.002 feet/feet across the Site and the direction of flow is toward the east with a slight southeasterly course. Variations occur in the vicinity of pumping wells (such as municipal, irrigation, and industrial wells) and recharge areas, and with the season.

- The hydraulic conductivity and transmissivity of the Pleistocene aquifer have been measured by previous investigations at various Subsites within the Site. Based on data from municipal wells, the local hydraulic conductivity has been estimated to range between 22 and 275 feet per day (ft/day). Pumping tests conducted in unconsolidated sand and gravel sediments east of Hastings indicated a transmissivity value of 24,500 square feet per day (ft^2/day) and a hydraulic conductivity of 200 ft/day. A 67-hour pumping test was conducted in irrigation well I-49 in January 1994. The test demonstrated the transmissivity of the aquifer is about 23,000 ft^2/day. Pumping tests performed at the other subsites have provided hydraulic conductivity values in a similar range, with transmissivity ranging between 5,000 ft^2/day and 25,000 ft^2/day. Combining the estimated transmissivity with the hydraulic gradient and porosity results in a ground water flow velocity at the Site which ranges from about 0.5 to 1.5 ft/day (190 to 540 ft/year). The approximate rate of ground water flow per unit width of aquifer is about 200 gallons per day/foot.

GROUND WATER CONTAMINATION RESULTS

Table 1 shows the wells where EDB and CT appear above their MCLs. Figures 3 and 4 show the area contour where EDB and CT appear above their MCLs.

- CT and EDB detected at and downgradient of the Subsite likely originated from accidental releases of liquid phase EDB and CT at the Subsite. CT and EDB were components of Max-Kill 10, a liquid grain fumigant that was used by Morrison-Quirk. These liquids migrated downward through the unsaturated zone with some portion adhering to soil above the water table. Contaminants have also migrated to the saturated zone where they were dissolved in ground water and then traveled in a generally eastward direction with ground water.

- Operation of an SVE system at the Subsite in 1990 and from 1997 to 2003, and ground water pumping over the past eight years at Well D have removed substantial amounts of both EDB and CT in the source area, and concentrations have been decreasing in wells downgradient of the source area. Concentrations of EDB and CT have decreased in wells downgradient of Well D.

- Pumping at Well D was initiated in 1997. Since that time it has pumped at an average rate of about 400 to 500 gpm, for a total of more than 200 million gallons per year. CT and EDB between the Subsite and Well D are contained by Well D. Monitoring of well CD-06, downgradient of the WEC, has not detected any CT or EDB for seven or more consecutive quarters.

- EDB and CT are also removed by seasonal irrigation wells such as I-49 and I-51 which intercept the plume (Figures 3 and 4 show 11 irrigation wells). The sampling data from the irrigation wells appear to indicate that the plume of CT and EDB is shrinking in size. The overall concentrations of EDB and CT are decreasing. These wells also indicate that the current extent of CT and EDB above their respective MCLs appears smaller than the extent depicted by EPA for the year 1992 (Figures 3 and 4). However, this data must be viewed in light of the fact that irrigation wells pump at a high rate, allowing volatilization to occur, and if there were monitoring wells in the same general area, the concentrations of the COCs in the ground water measured from those monitoring wells would most likely appear higher.

- In the source area, well MW-08 exhibits the highest levels of both EDB and CT on or near the Subsite. In 2004, concentrations of EDB ranged from 86 to 302 micrograms per liter (μg/L). Concentrations of CT during the same period varied from 180 to 217 μg/L. Data provided in the five-year monitoring report established that these concentrations have varied on an annual cycle, peaking during the third quarter of each year when the water table is drawn down by irrigation pumping. Over the course of each year, as the water table rises and falls in response to seasonal ground water variations, this contaminated zone of water moves into and out of the well's screened interval causing the observed variation in contaminant concentrations.

- In late 2005 through mid 2007, concentrations of EDB in well MW-08 declined by several orders of magnitude independent of the seasonal cycle described above. For the past four sampling rounds, the concentrations of EDB in well MW-08 have not exceeded 2.3 μg/L. This is about two orders of magnitude lower than the maximum concentrations measured in 2004. Concentrations of EDB at Well D have also decreased to historic lows, not exceeding 0.1 μg/L in the past six sampling rounds. This change in the EDB concentrations reflects a depletion of EDB released from the source area west of well MW-08. In effect, the data indicate that releases of EDB from the source area have been reduced by 99 percent or more. However, CT was still present at concentrations well above the MCL in MW-08 and elsewhere in the plume.

SECTION VI. CURRENT AND POTENTIAL FUTURE SUBSITE AND RESOURCE USES

GROUND AND SURFACE WATER USES

Ground water is the primary source for drinking water utilized by the city of Hastings both now and in the future. Currently, private wells are known not to be used for potable purposes at the Subsite. Use restrictions are in place to prevent residential/potable water wells being installed in the OU 6 area in the future. The aquifer is a prolific source of ground water.

The Subsite is located within the Institutional Control Area (ICA) which was established under the Area-Wide Consent Decree for the Hastings Site (Civil Action No. 8:03CV531). Institutional controls (ICs) are in place and are being maintained as a requirement of the Area-Wide Consent Decree. The ICA encompasses the area in Hastings bound by 12th Street on the north, Maxon Avenue on the east, J Street on the south, and Crane Avenue on the west. The ICs include monitoring the wells within the ICA, posting warning signs regarding the contamination of the ground water, and providing alternate water to any resident whose private well is contaminated above health-based levels. In addition to these ICs, the city of Hastings has enacted an ordinance which restricts the installation of wells within the ICA.

Surface water bodies in the area include creeks and ponds. Many of the streams and ponds are intermittent and not sufficient as perennial sources of water. Among all RI-phase water samples, the data indicate that VOCs occur only in ground water—not surface water.

SECTION VII. SUMMARY OF SUBSITE RISKS

As part of the RI/FS process, a Baseline Risk Assessment was developed to estimate the human health and environmental risks associated with possible exposure to contaminants identified at OU 6.

The Baseline Risk Assessment was conducted in accordance with all relevant and current EPA risk-assessment guidance: COCs were identified, toxicities of these chemicals were reviewed, potential exposures were defined, and risk characterization was quantified. This analysis provided valuable information used to determine the need for remedial actions. The purpose of this section is to summarize the results of the assessment. For more information, readers are referred to the actual report which is included in the Administrative Record.

This section presents separately the two risk categories—human health and ecological.

HUMAN HEALTH RISK ASSESSMENT

As presented earlier in the Site Characteristics section, the Conceptual Subsite Model identified two potential pathways for contamination to pose risks to human health: ground water and air. The remainder of the human health subsection will address these pathways.

Ground Water Exposure Pathway

Identification of Contaminants of Concern (COCs)

The initial step involved reviewing OU 6 ground water contaminant concentrations from historical analytical data. CT and EDB were reported as COCs.

Exposure Assessment

The exposure assessment was accomplished through the identification of exposure pathways and the development of exposure scenarios. Under current conditions, no complete exposure pathway for ground water was identified, as no private drinking water wells currently in use have been characterized above MCLs for COCs. The OU 6 testing data indicate VOCs associated with the Subsite are not impacting Hastings' municipal wells.

For reasonably anticipated future uses, the assumption was made that a drinking water well could be placed into the affected area. As a result, consumption is a potentially complete exposure pathway.

The exposure assessment for ground water includes two reasonable maximum exposure scenarios:

- Future potable uses of the contaminated aquifer in OU 6 through installation of a private drinking water well.
- Future inhalation of ground water contaminants which volatilize and migrate up through the soils into new buildings (residential or commercial) constructed on properties above the FAR-MAR-CO plume.

Toxicity Assessment

Both the potential for carcinogenic health risk, as well as noncarcinogenic health risk, are evaluated as part of the toxicity assessment.

Both of the ground water COCs are viewed by EPA to be *possible* or *probable* human carcinogens, and are otherwise known to have adverse noncarcinogenic health effects. Consequently, both noncarcinogenic and carcinogenic risks due to exposure to these compounds were evaluated.

EPA evaluates the potential for noncarcinogenic health risk by comparing estimated contaminant intake to a reference dose (a dose of a given chemical that has previously been tested for health effects). EPA's Integrated Risk Information System (IRIS) specifies contaminant-specific reference dose values that have been verified by an intra-agency work group. Values that have not been verified by the work group are presented within EPA's Health Effects Assessment Summary Tables (HEAST). The ratio of contaminant intake to the reference dose is referred to as the hazard quotient or hazard index. A hazard quotient greater than one indicates a hazard to humans may be likely to exist. The potential for carcinogenic risk is estimated by multiplying estimated contaminant intake by an established slope factor (a value established by previous testing to determine the degree to which chemicals cause cancer obtained from EPA's IRIS and HEAST databases) for each contaminant (Table 2). The resulting figure represents the chance that a human would develop cancer in excess of the normal background cancer rate. For example, an excess risk of one in 10,000 (represented as 1×10^{-4}) indicates one additional person may contract cancer out of 10,000 people identically exposed to a contaminant. A cancer risk greater than one in 10,000 (1×10^{-4}) is considered unacceptable by EPA and requires remedial action. A cancer risk less than one in 1,000,000 (1×10^{-6}) is considered acceptable. The cancer risk range between 1×10^{-6} and 1×10^{-4} is considered acceptable unless specific conditions warrant otherwise. The calculated carcinogenic risks are viewed as conservatively high due to EPA's carcinogenic risk assessment methodology.

Risk Characterization

Default exposure assumptions have been derived and published by EPA for potable uses. Exposure assumptions for potable uses include ingestion of the contaminated ground water, dermal absorption, and inhalation of volatile chemicals based on household water uses such as showering, laundering, etc.

Finally, actual Subsite data (maximum concentrations) were compared to risk-based, potable water criteria. Subsite concentrations exceeded the risk-based concentrations for both COCs. As a consequence, the response action selected in this ROD is necessary to protect human health from actual or threatened releases of hazardous substances into the environment.

ECOLOGICAL RISK ASSESSMENT

The ground water beneath the Subsite was evaluated for the potential ecological risks associated with constituents detected in this medium. Along with describing the environmental setting and identifying the compounds known or suspected to exist at the Subsite, the fate of the chemicals at the Subsite and the identification of potentially complete exposure pathways are determined. Screening-level estimates of exposure for completed exposure pathways are used to develop preliminary, conservative estimates of risk.

Evaluating potential exposure pathways is one of the primary tasks of the screening-level characterization of OU 6. For an exposure pathway to be complete, a constituent must be able to travel from the source to ecological receptors and be taken up by the receptors via one or more exposure routes.

One of EPA's key questions developed in screening-level problem formulation is: "Which habitats present on-site are potentially contaminated or otherwise disturbed?" For OU 6, in order for a habitat to be contaminated or disturbed, allowing wildlife receptors contact with Subsite-related compounds, constituents in ground water must be released to surface water bodies (streams, rivers, lakes) or drainage ways, or ecological receptors must be in direct contact with the ground water (e.g., live in the ground water). Previous work at the Subsite had already successfully dealt with soil contamination to such an extent that soil is not considered a potential source of contamination to ecological receptors. Surrounding land includes residential, commercial, agricultural, and industrial property. There are no receptors living in the ground water, and no surface water bodies are located near the Subsite.

The potential for the OU 6 plume to come in contact with resident ecological receptors was evaluated using the available geological and site characterization data. The characterization data show that ground water COCs associated with OU 6 are not discharging to surface waters. Since these aquatic habitats necessary for the presence of ecological receptors are not receiving chemicals associated with the Subsite, ecological receptors cannot contact or take up Subsite-related constituents.

Since there is no complete exposure pathway between the OU 6 contaminants and any ecological receptors, the constituents detected in the ground water do not pose an ecological threat.

SECTION VIII. REMEDIAL ACTION OBJECTIVES

Remedial Action Objectives (RAOs) are a description of what the cleanup is expected to accomplish. For OU 6 the RAOs are defined as follows:

- Attain MCLs for the COCs in the ground water migrating from the Subsite. The remedial alternatives to be evaluated will focus on an area of attainment for the Subsite, comprised of the zone where current water quality data establish the presence of EDB and CT emanating from the Subsite above the MCLs. Overall, the final remedy selected will be protective of human health and the environment and will be in compliance with ARARs and the Administrative Order on Consent.

As calculated in the Baseline Risk Assessment, unacceptable future risks for OU 6 will be addressed by achieving the RAOs.

The RAOs will be met when MCLs for the COCs are achieved in the OU 6 plume. The MCLs and risk-based standards for the two subsite COCs are presented below:

Chemical	MCL, ug/L	Risk-Based Standard,ug/L
EDB	0.05	0.0056
CT	5.0	0.017

SECTION IX. DESCRIPTION OF ALTERNATIVES

To address the RAOs, five alternatives are presented in this section. These alternatives were developed and presented in the FS Report. The selected remedy identified in this ROD will be chosen from the five alternatives.

Costs presented in this section were developed in the FS Report and based on current data, best available vendor information, and professional judgment. Estimated time frames to achieve applicable or relevant and appropriate requirements (ARARs) and Performance Standards for the contaminated ground water are based on estimated degradation rates using historic OU 6 data. For a greater level of detail, readers are referred to the FS Report.

DESCRIPTION OF REMEDY COMPONENTS

ALTERNATIVE 1: NO ACTION

Estimated Capital Cost: $0
Estimated Operation & Maintenance (O&M) Cost: $0
Estimated Present-Worth Cost: $0
Estimated Time to Achieve RAO: Not timely

Regulations governing the Superfund program require that the *no action* alternative be evaluated to establish a baseline for comparison. Under this alternative, EPA would take no action at OU 6 to prevent exposure to contaminated ground water. The ICs, part of the Area-Wide Consent Decree requirements, would reduce the possibility of direct exposure and thereby the risk to human health from contaminated ground water. However, there would be no Subsite monitoring to discern the changes occurring in the levels of contamination in OU 6 and to determine if the remedial action objectives are ever achieved.

ALTERNATIVE 2: GROUND WATER EXTRACTION AT WELL D, CHIEF ETHANOL, AND WEC WELLS; TREATMENT AND DISPOSAL AT INDUSTRIAL FACILITY

Estimated Capital Cost: $0
*Estimated O&M Cost: $1,846,880**
Estimated Present Worth Cost: $978,298
Estimated Time to Achieve RAO: Approximately 50 years
** represents 20 years of O&M*

Alternative 2 includes extraction of ground water at Well D, Wells IN-05 and IN-11 at the Chief Ethanol Plant, and the WEC Wells A, B, and C, and use in industrial processes.

A portion of the extracted water at the WEC is used for non-contact cooling water. Following its use, treatment occurs as the cooling water containing VOCs passes through a cooling tower, transferring these compounds to the air (air discharges must meet the WEC's Air Permit requirements). Unvaporized water is discharged to the surge pond. A smaller volume of the water is also used in other industrial processes (disposal of fly ash, bottom ash, and generation of steam) and is discharged to WEC's fly-ash pond or in the chemical wastewater lagoon. A smaller volume yet is used to cool critical bearing assemblies. The process of this action agitates the water and causes volatilization. This water goes into floor drains, and into either the sewer (storm and sanitary) or the neutralization pond.

Water pumped from Wells IN-05 and IN-11 at the Chief Ethanol plant is used as cooling water, boiler water, and process water consisting of water in the ethanol creation process, cleaning, washdowns, and maintenance. A portion of the pumped ground water is treated through reverse osmosis with the treated water being used for some cooling water and the entire boiler feed water. The remaining portion water is used as cooling water and process water for ethanol production, cleaning, washdowns, and maintenance. Once the ethanol is created, the remaining corn mash is decanted and sold as livestock feed. The decanted water is evaporated to concentrate solids to be sold as syrup. The water vapor is condensed to create condensate that is recycled back to the process or treated in the waste water treatment system. Cooling tower blowdown and process water from equipment, cleaning, washdowns, and maintenance are treated on-site. Any VOCs pumped from the ground water would be volatilized by this entire process. All process treated waste water, reverse osmosis blowdown, and boiler blowdown is discharged to the West Fork of the Big Blue River, by permit.

Continued monitoring will demonstrate that the remediation goals have been met or will be met within a reasonable time frame.

This alternative, in conjunction with the ICs in place, would reduce the possibility of direct exposure and thereby the risk to human health from contaminated ground water. However, this alternative would not address the source of contamination in the ground water, which is most concentrated near MW-8.

ALTERNATIVE 3: GROUND WATER EXTRACTION AT WELL D, CHIEF ETHANOL, AND WEC WELLS, AND AT WELL NEAR SOURCE ZONE; TREATMENT AND DISPOSAL AT INDUSTRIAL FACILITY

Estimated Capital Cost: $258,946
*Estimated O&M Cost: $2,182,873**
Estimated Present Worth Cost: $1,156,269
Estimated Time to Achieve RAO: 45 – 50 years
** represents 20 years of O&M*

Like Alternative 2, 4, and 5, Alternative 3 includes extraction of ground water at Well D, Wells IN-05 and IN-11 at the Chief Ethanol Plant, and the WEC Wells A, B, and C. Treatment is provided at WEC and Chief Ethanol, as described above for Alternative 2.

Alternative 3 includes the addition of an extraction well in the source area. The new well would be installed in the vicinity of well MW-8, and is projected to pump at a rate of approximately 25 gpm. The most cost-effective treatment method would be connection of the new well effluent line to that for Well D, and then pumping the combined effluent to the WEC for treatment and disposal.

As described in Alternative 2, this alternative, in conjunction with ICs, would reduce risk to human health from contaminated ground water.

ALTERNATIVE 4: GROUND WATER EXTRACTION AT WELL D, CHIEF ETHANOL, AND WEC WELLS, TREATMENT AND DISPOSAL AT INDUSTRIAL FACILITY WITH ALTERNATIVE CLEANUP STANDARD

Estimated Capital Cost: $0
*Estimated O&M Cost: $1,846,880**
Estimated Present Worth Cost: $ Unknown
Estimated Time to Achieve RAO: Unknown
** represents 20 years of O&M*

Alternative 4 is identical to Alternative 2 with the exception that the treatment standard for the COCs would be revised to higher concentrations. This would effectively make attainment of standards easier, and the time for treatment would be truncated. The exact length of time needed to reach RAOs would depend on the new treatment standards.

As described in Alternative 2, this alternative, in conjunction with ICs, would reduce risk to human health from contaminated ground water. However, this alternative would not address the source of contamination in the ground water, which is most concentrated near MW-8.

ALTERNATIVE 5: GROUND WATER EXTRACTION AT WELL D, CHIEF ETHANOL, AND WEC WELLS, AND ENHANCED IN SITU BIOREMEDIATION IN SOURCE AREA

Estimated Capital Cost: $105,360
*Estimated O&M Cost: $1,976,628**
Estimated Present Worth Cost: $1,097,158
Estimated Time to Achieve RAO: 45 – 50 years
** represents 20 years of O&M*

Like Alternatives 2, 3 and 4, Alternative 5 includes extraction of ground water at Well D, Wells IN-05 and IN-11 at the Chief Ethanol Plant, and the WEC Wells A, B, and C. Treatment is provided at WEC and Chief Ethanol, as described above for Alternative 2.

Alternative 5 includes the addition of in situ bioremediation near the source area. A single injection well would be installed upgradient of MW-8, in the source area for CT and EDB contamination. A nutrient-rich solution would be injected for the purposes of altering the ground water geochemical environment to enhance reductive dehalogenation of CT and EDB. A program to monitor the effectiveness of this portion of the remedy will be established as part of the remedial design.

As described in Alternative 2, this alternative, in conjunction with ICs, would reduce risk to human health from contaminated ground water.

COMMON ELEMENTS AND DISTINGUISHING FEATURES OF EACH ALTERNATIVE

The four "action" alternatives include the following common elements (the "no action" alternative includes just the third element listed below.):

- Ground water extraction will be accomplished by Well D, Wells IN-05 and IN-11 at the Chief Ethanol Plant, and the WEC Wells A, B, and C.
- Treatment of the extracted ground water will be provided at the WEC and Chief Ethanol.

- ICs are in effect for the Subsite through the Area-Wide Consent Decree and act to ensure that contaminated ground water is not used for potable purposes.

- Periodic ground water monitoring associated with implementation of remedies would be required.

- In conjunction with this periodic ground water monitoring, installation of additional monitoring well nests downgradient of Well D would be required.

- Alternatives 2, 3, and 5 are required to attain the RAOs. Alternatives 1 and 4 will not attain RAOs.

The main distinguishing feature separating the "action" alternatives is the level of protection and timeliness of action associated with each. In particular, Alternative 5 is the most comprehensive of the alternatives in addressing the RAOs.

EXPECTED OUTCOMES OF EACH ALTERNATIVE

The overall expected outcome of the four "action" alternatives is reduction of risk by prevention of exposure to contaminants or contaminant migration from the Subsite through limitation of aquifer use. Alternative 1 does not measure when, if ever, RAOs are achieved. Alternative 2 may achieve RAOs for the plume, but not in as timely a manner as Alternatives 3 and 5. Alternative 3 will achieve RAOs, but is a less comprehensive remedial action than Alternative 5, and is slightly more costly than Alternative 5 to implement. Alternative 4 will not achieve RAOs as they are currently defined. Alternative 5 would achieve RAOs in a slightly shorter time frame (45 to 50 years) than Alternatives 2 and 4.

SECTION X. COMPARATIVE ANALYSIS OF ALTERNATIVES

Nine criteria are used to evaluate the different remediation alternatives individually and against each other in order to select a preferred remedy. This section of the ROD profiles the relative performance of each alternative against the nine criteria, noting how it compares to the other options under consideration. The nine evaluation criteria are discussed below.

EVALUATION CRITERIA FOR SUPERFUND REMEDIAL ALTERNATIVES
Overall Protectiveness of Human Health and the Environment determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through ICs, engineering controls, or treatment.
Compliance with ARARs evaluates whether the alternative meets federal and state environmental statutes, regulations, and other requirements that pertain to the site, or whether a waiver is justified.
Long-term Effectiveness and Permanence considers the ability of an alternative to maintain protection of human health and the environment over time.
Reduction of Toxicity, Mobility, or Volume of Contaminants Through Treatment evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.
Short-term Effectiveness considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation.
Implementability considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.
Cost includes estimated capital and annual O&M costs as well as present-worth cost. Present-worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent.
State/Support Agency Acceptance considers whether the state agrees with EPA's analyses and recommendations as described in the RI/FS and Proposed Plan.
Community Acceptance considers whether the local community agrees with EPA's analyses and Selected Remedy. Comments received on the Proposed Plan are an important indicator of community acceptance.

Overall Protectiveness and Compliance with ARARs are classified as Threshold Criteria, meaning that alternatives failing to satisfy either of these two criteria will be eliminated from further analysis. The next five criteria on the table above comprise the Balancing Criteria used to rank alternatives against one another. The last two criteria, State and Community Acceptance, are Modifying Criteria which are given serious consideration and which can affect the decision process. A summary of the comparative analysis is presented in Table 6.

SECTION XI. PRINCIPAL THREAT WASTES

Principal threat wastes represent the sources of the hazardous substances that contribute to the unacceptable risk on-site. Principal threat wastes were not identified at OU 6. The OU 6 ground water contamination has migrated from an area considered a principal threat-OU 3. The OU 3 source materials were identified years ago and remediated by Farmland, as discussed in Section II of this ROD.

SECTION XII. SELECTED REMEDY

Summary of the Rationale for the Selected Remedy

EPA and NDEQ have determined the selected remedy for OU 6 is Alternative 5. This remedy was selected because it offers superior short- and long-term protection (and thus overall protection of human health and the environment) and reduction of mobility, toxicity, and volume when compared with the other alternatives. It is equally implementable as the other alternatives. Alternatives 3 and 5 would reach compliance with RAOs a bit sooner than Alternative 2, and Alternatives 1 and 4 would not achieve RAOs at all. The cost of Alternative 5 is lower than that of Alternative 3 though higher than the other alternatives, but not by so great a margin that cost represents a major impediment to implementation. The selected remedy will provide overall protection of human health and the environment by eliminating, reducing, or controlling all potential risks posed by the exposure pathways at OU 6. The treatment technologies and remedial actions included in the selected remedy will comply with ARARs and achieve Performance Standards listed in Section VIII.

Description of the Selected Remedy

Alternative 5 includes:

- Enhanced In Situ Bioremediation near Source Zone – A single injection well will be installed upgradient of MW-08, in the source area for CT and EDB contamination. A nutrient-rich solution will be injected for the purposes of altering the ground water geochemical environment to enhance reductive dehalogenation of CT and EDB. Nutrient amendment will be used to locally modify the reduction/oxidation reaction conditions in the aquifer to encourage anaerobic conditions. Both CT and EDB are amenable to reductive dehalogenation. A program to monitor the effectiveness of this portion of the remedy will be established as part of the remedial design. The precise chemical composition, viscosity, and delivery schedule of the nutrient amendment will be developed during final remedial design.

- Ground Water Extraction at Well D – Ground water extraction will be accomplished by Well D (primary containment), Wells IN-05 and IN-11 at the Chief Ethanol Plant (secondary containment), and the WEC Wells A, B, and C (tertiary containment). (This assumes the Chief Ethanol and WEC wells continue to operate as they presently do. If there is a change in well operation, alternate provisions would be made for secondary and tertiary containment.) Containment of the impacted ground water plume associated with the Subsite will prevent the migration of VOCs which exceed the target concentrations beyond the boundaries of the ICA.

- Treatment and Disposal at Industrial Facility – The VOCs associated with OU 6 will be treated or destroyed as part of the process at the WEC and Chief Ethanol, wherein the water is used as cooling liquid, after which the VOCs are stripped as the water is processed through a cooling tower.

- Expanded Monitoring Program – This monitoring program will include the installation of monitoring wells in locations which will allow for the measurement of the effectiveness and efficiency of the ground water extraction system to hydraulically control FAR-MAR-CO's dissolved contaminant plume. If data generated from the expanded monitoring program suggest that the Preferred Alternative is not adequately controlling the contaminant plume, additional remedial steps will be considered and taken as appropriate. A program to monitor the effectiveness of this portion of the remedy will be established as part of the remedial design. Should monitoring of ground water between the source area and Well D indicate the enhanced in situ bioremediation component of the remedy is not effectively remediating the source area, additional remedial steps will be considered and taken as appropriate. In addition to more monitoring wells, periodic sampling of the effluent at the WEC and Chief Ethanol will be performed to confirm that treatment processes are adequately reducing contaminant levels.

<u>Summary of the Estimated Remedy Costs</u>

The total present-worth cost estimate for the selected remedy is $1,197,158. The cost estimate assumes that 45 to 50 years is the time required to achieve the Performance Standards, but includes only 20 years of estimated O&M. Table 6 contains a detailed accounting of costs for the selected remedy including capital and O&M.

The information in this cost estimate summary table is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. Changes may be documented in the form of a memorandum in the Administrative Record and Explanation of Significant Differences document. Major changes will be documented in a ROD amendment. The cost estimate is an order-of-magnitude, engineering cost estimate that is expected to be within the +50 to -30 percent range of the actual project cost.

<u>Expected Outcomes of the Selected Remedy</u>

An estimated 45 to 50 years will be required to achieve Performance Standards in the OU 6 aquifer. After achieving Performance Standards, OU 6 ground water will be suitable for unrestricted uses including but not limited to drinking water supply and commercial/industrial applications. Performance Standards for the Subsite are the MCLs established under the Safe Drinking Water Act (SDWA).

SECTION XIII. STATUTORY DETERMINATIONS

Under CERCLA §121 and the NCP, the lead Agency must select remedies that are protective of human health and the environment, comply with ARARs, are cost effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous wastes as a principal element and a bias against off-site disposal of untreated wastes. The following sections discuss how the selected remedy meets these statutory requirements.

PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

The selected remedy, through use of ground water use restrictions; enhanced in situ bioremediation near the source zone; ground water extraction at Well D, Wells IN-05 and IN-11 at the Chief Ethanol Plant, and the WEC Wells A, B, and C, treatment and disposal at the WEC; and an expanded monitoring program will protect human health and the environment. The unacceptable future risks associated with VOCs in the ground water will be reduced to within acceptable levels by treating ground water to below MCLs using aeration. Short-term risks will be addressed by use restrictions barring well construction in the area of the contaminated aquifer in OU 6, thereby preventing exposure to contaminated ground water. These restrictions are in place through the Area-Wide Consent Decree which established an Institutional Control Area.

COMPLIANCE WITH ARARs

The selected remedy of enhanced in situ bioremediation, extraction of contaminated ground water, and treatment at industrial facilities complies with all ARARs. The ARARs are presented below and in more detail in Table 5.

Chemical Specific:

Chemical-specific ARARs set treatment levels for the contaminants that are considered protective of human health and the environment. The levels are media specific. Chemical-specific ARARs may also set acceptable levels for the contaminants in discharged media if discharge occurs as part of a remedial activity. A state requirement is an ARAR only if it is more stringent than the corresponding federal requirement. Chemical-specific ARARs include the following:

- Federal Safe Drinking Water Act MCLs, 40 CFR sections 141.50 – 141.51, and 40 CFR §§ 141.11 – 141.16.
- Nebraska Ground Water Quality Standards and Use Classifications, Title 118

Location Specific:

Location-specific ARARs are requirements that might apply to a remedial action due to the site's unique cultural, archaeological, historical, or physical setting. Location-specific ARARs will not apply to the remedial action at the Subsite because there are no such features in the Subsite area.

Action Specific:

Action-specific requirements control or restrict the activities that are selected to accomplish the remedy, not a specific contaminant. Action-specific ARARs may establish performance levels, actions, or technologies as well as specific levels for discharged or residual contaminants. The action-specific ARARs may, for each alternative, vary depending on the technologies employed by the alternative. Action-specific ARARs include the following:

- Ground Water Monitoring:

The substantive ground water monitoring requirements are relevant and appropriate as specified in RCRA 40 CFR 264, Subpart F.

- Air Emissions:

The use of air stripping with no emission controls results in the discharge of VOCs into the atmosphere. NDEQ's Title 120 limits discharges of VOCs to 2.5 tons per year. Air emissions will comply with the Clean Air Act, 33 U.S.C. §§ 1251 et seq as well as NDEQ's Title 129, Air Pollution Control Regulations.

Well installation:

Title 178 of Nebraska Health & Human Services System (NHHSS) Regulations governing monitoring well installation, well drilling, pump installation and well abandonment; and Title 456 of Nebraska Department of Natural Resources (NDNR) Regulations governing monitoring well registration.

COST EFFECTIVENESS

The selected remedy is cost effective and represents a reasonable value for the expenditure required. In making this determination, the following definition was used: "A remedy shall be cost effective if its costs are proportional to its overall effectiveness" [NCP § 300.430(f)(1)(ii)(D)]. The determination of cost-effectiveness was made by evaluating the overall effectiveness of the selected remedy and comparing that to the costs of its implementation. The conclusion supported the determination that the selected remedy is cost-effective.

The estimated present-worth cost of the selected remedy is $1,197,158. Alternative 1 has no costs associated with it but it is not protective. Alternative 2 is less expensive than Alternative 5 but would provide a lower level of protection to potential receptors of VOC-contaminated ground water, and would require more time to remediate the ground water contamination below MCLs. Alternative 3 provides similar protection to that provided by Alternative 5, but is slightly less expansive and more expensive. Alternative 4 has indeterminate costs, but would almost certainly be less expensive than Alternative 5. However, Alternative 4 does not meet RAOs. EPA believes that the enhanced in situ bioremediation and more robust monitoring network associated with Alternative 5 make it the best available alternative.

UTILIZATION OF PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT TECHNOLOGIES TO THE MAXIMUM EXTENT

The selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner at OU 6. The selected remedy provides the best balance of trade-offs in terms of the five balancing criteria while also considering the statutory preference for treatment as a principal element and bias against off-site treatment and disposal. The selected remedy has acceptance by the State. A set of comments was received from SSPA, on behalf of Morrison Enterprises, which indicated a preference for selection of Alternative 2. No other comments were received from the public.

Relative to other alternatives, the selected remedy offers superior short- and long-term effectiveness, and reduction of volume and mobility through treatment. Extraction and treatment will reduce the contamination levels in the OU 6 aquifer to MCLs. Treatment through enhanced in situ bioremediation and use as non-contact cooling water will ensure that VOCs are adequately destroyed. Ground water use restrictions will prevent the public from utilizing contaminated ground water.

PREFERENCE FOR TREATMENT

Contaminated ground water will be addressed through treatment, combined with engineering controls (containment) and institutional controls

As documented, extraction of contaminated ground water via Well D, Wells IN-05 and IN-11 at the Chief Ethanol Plant, and the WEC Wells A, B, and C is reducing the concentration of VOCs in the aquifer, and Natural Attenuation (NA) is contributing to the process. The statutory preference for remedies that employ treatment as a principal element is satisfied by Alternative 5. Enhanced in situ bioremediation, and extraction of water and use of the extracted water as non-contact cooling water and/or in other industrial processes which remove the contamination is a significant portion of this remedy.

FIVE-YEAR REVIEW REQUIREMENT

Because the selected remedy will result in hazardous substances, pollutants, or contaminants remaining on the Site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five years after initiation of the remedial action to ensure the remedy is and will be protective of human health and the environment. The five-year review process was initiated five years after the Hastings Ground Water Contamination Site Well 3 Subsite OU 7 remedial action began. The next sequential submission of this document would be in July 2012. It is appropriate that it be considered as accommodating the five-year review requirement for the FAR-MAR-CO Subsite as well.

GLOSSARY

Specialized terms used in this ROD are defined below:

Administrative Order on Consent (Consent Order): In this ROD the Consent Order is a legal agreement signed by EPA and a potentially responsible party (PRP) that requires the PRP to perform a response action that is necessary as a result of a release or threat of release of hazardous substances.

Administrative Record (AR): The body of documents that *forms the basis* for selection of a particular response at a site. An AR is available at or near the site to permit interested individuals to review the documents and to allow meaningful public participation in the remedy selection process.

Aquifer: An underground layer of rock, sand, or gravel capable of storing water within cracks and pore spaces or between grains. When water contained within an aquifer is of sufficient quantity and quality, it can be used for drinking or other purposes. The water contained in the aquifer is called ground water.

Applicable or Relevant and Appropriate Requirements (ARARs): The federal and state environmental laws and regulations that a selected remedy will meet.

Capital Costs: Expenses associated with the initial construction of a project.

Contaminants of Concern (COCs): Chemicals, identified during the site investigations and risk assessments, that pose a potential risk because of their toxicity and potential routes of exposure to public health and the environment.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA): The law enacted by Congress in 1980 to evaluate and clean up abandoned, hazardous waste sites. EPA was charged with the mission to implement and enforce CERCLA.

Consent Decree: A legal document, approved by a judge, that formalizes an agreement between EPA and one or more PRPs outlining the terms by which the response action will take place. A Consent Decree is subject to a public comment period prior to its approval by a judge, and is enforceable as a final judgment by a court.

Contaminant Plume: A column of contamination with measurable horizontal and vertical dimensions that is suspended in and moves with groundwater.

Downgradient: Downstream from the flow of ground water. The term refers to ground water flow in the same way that it does to a river's flow.

Ground water: Water beneath the Earth's surface that fills pores in soils or openings in rocks to the point of saturation. Ground water is often used as a source of drinking water via municipal or domestic wells.

In Situ Chemical Oxidation (ISCO): A technology using chemicals called oxidants to destroy and convert contaminants in soil and ground water into harmless compounds like water and carbon dioxide. The chemical oxidation process requires direct contact of the oxidants with contaminated media. This process is conducted in situ (or in place) rather than through extracting contaminated media to be treated at the ground surface.

Institutional Controls (ICs): The placement of laws, regulations, restrictions, etc., on a site/property, which assist or assure protection of human health by eliminating exposure pathways.

Maximum Contaminant Levels (MCLs): The maximum permissible level of a contaminant in water that is delivered to any user of a public water system, established by EPA under the authority of the Safe Drinking Water Act.

Migrate: To move from one area to another; to change location.

Natural Attenuation (NA): The reliance on NA processes (within the context of a carefully controlled and monitored site cleanup approach) to achieve site-specific remediation objectives within a time frame that is reasonable compared to that offered by other more active methods. The NA processes that are at work in such a remediation approach include a variety of physical, chemical, or biological processes that, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in soil or ground water. These in situ processes include biodegradation; dispersion; dilution; sorption; volatilization; radioactive decay; and chemical or biological stabilization, transformation, or destruction of contaminants.

Operable Unit (OU): Term for each of a number of separate activities undertaken as part of a Superfund site cleanup.

Operation and Maintenance (O&M): Activities conducted at a site after the construction phase to ensure that the cleanup continues to be effective.

Parts Per Billion (ppb): A unit of measurement used to describe levels of contamination. For example, one gallon of solvent in one billion gallons of water is equal to 1 ppb.

Performance Standards: Measurable values in the environment that allow evaluation of whether a remedial action has met a given objective.

Plume: A body of contaminated ground water flowing from a specific source.

Potentially Responsible Parties (PRPs): Any individual(s) or company(ies) such as owners, operators, transporters or generators who are potentially responsible, for the contamination problems at a Superfund site. Whenever possible, EPA requires PRPs, through administrative and legal actions, to clean up a hazardous waste site.

Present-worth Analysis: A method of evaluation of expenditures that occurs over different time periods. By discounting all costs to a common base year, the costs for different remedial actions can be compared on the basis of a single figure for each alternative.

Record of Decision (ROD): The decision document in which EPA selects the remedy for a Superfund site.

Remedial Action Objective (RAO): The specific purpose of a remedial action usually put in terms of measurable standards in environmental media.

Remedial Alternatives: The technology or combination of technologies used by EPA in treating, containing, or controlling contamination at a Superfund site.

Soil Vapor Extraction (SVE): (1) A treatment technology that removes vapors from air spaces in contaminated soil by setting up a pressure gradient or vacuum, often used in conjunction with air sparging (the injection of air into the ground); (2) Systems used to vacuum air and other gases from the unsaturated (vadose) zone above the water table; (3) An in situ soil aeration process designed and operated to maximize the volatilization of low-molecular-weight compounds with some biodegradation occurring.

Superfund: The program to locate and investigate and clean up the worst uncontrolled and abandoned toxic waste sites nationwide; administered by the Environmental Protection Agency.

Volatile Organic Compounds (VOCs): Carbon compounds (such as solvents) which readily volatilize at room temperature and atmospheric pressure. Most are not readily dissolved in water, but their solubility is above health-based standards for potable use. Some VOCs can cause cancer.

Figure 1 Hastings Subsite Locations

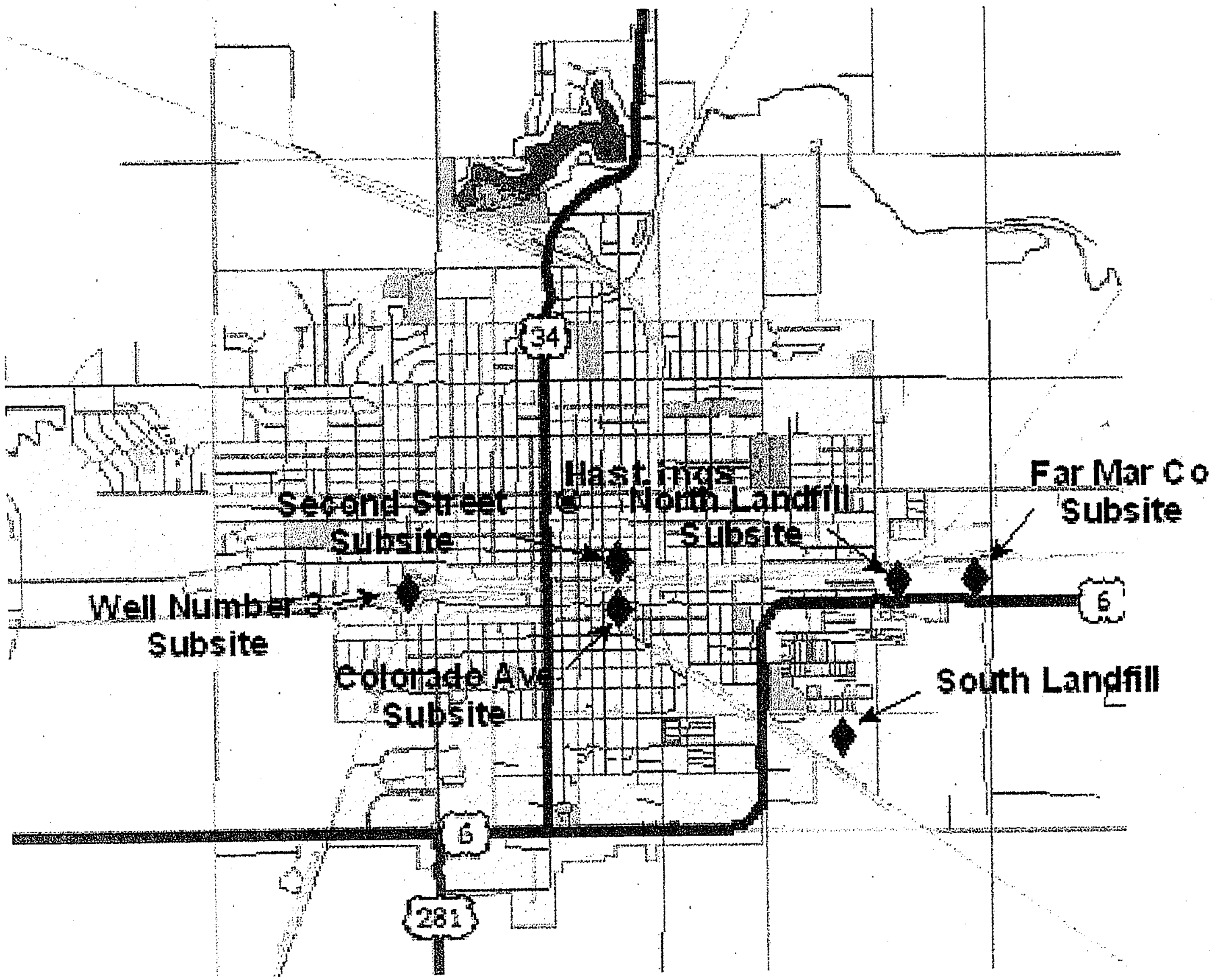


Figure 2 FAR-MAR-CO Subsite and Nearby Features

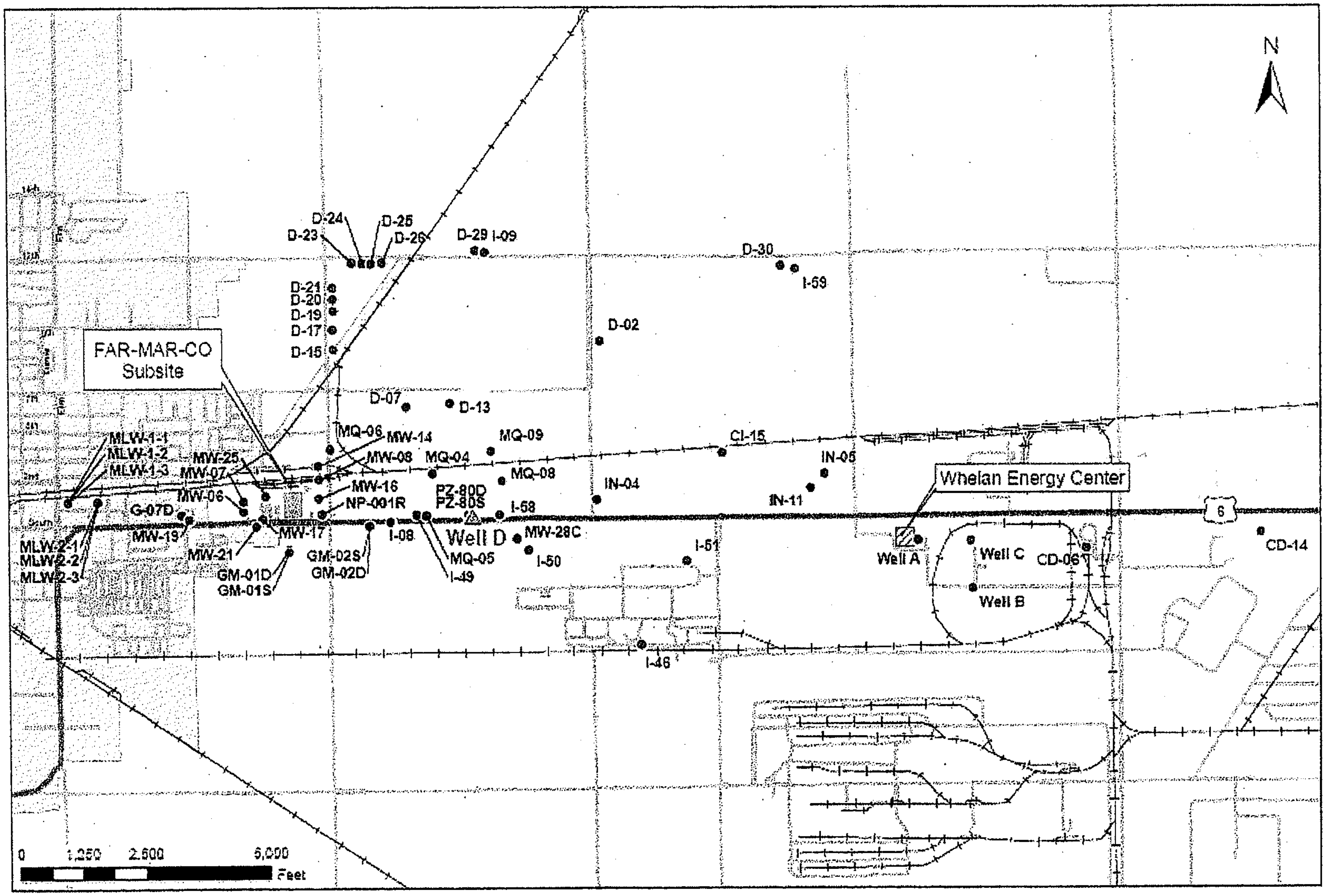


Figure 3 EDB Contaminant Plume

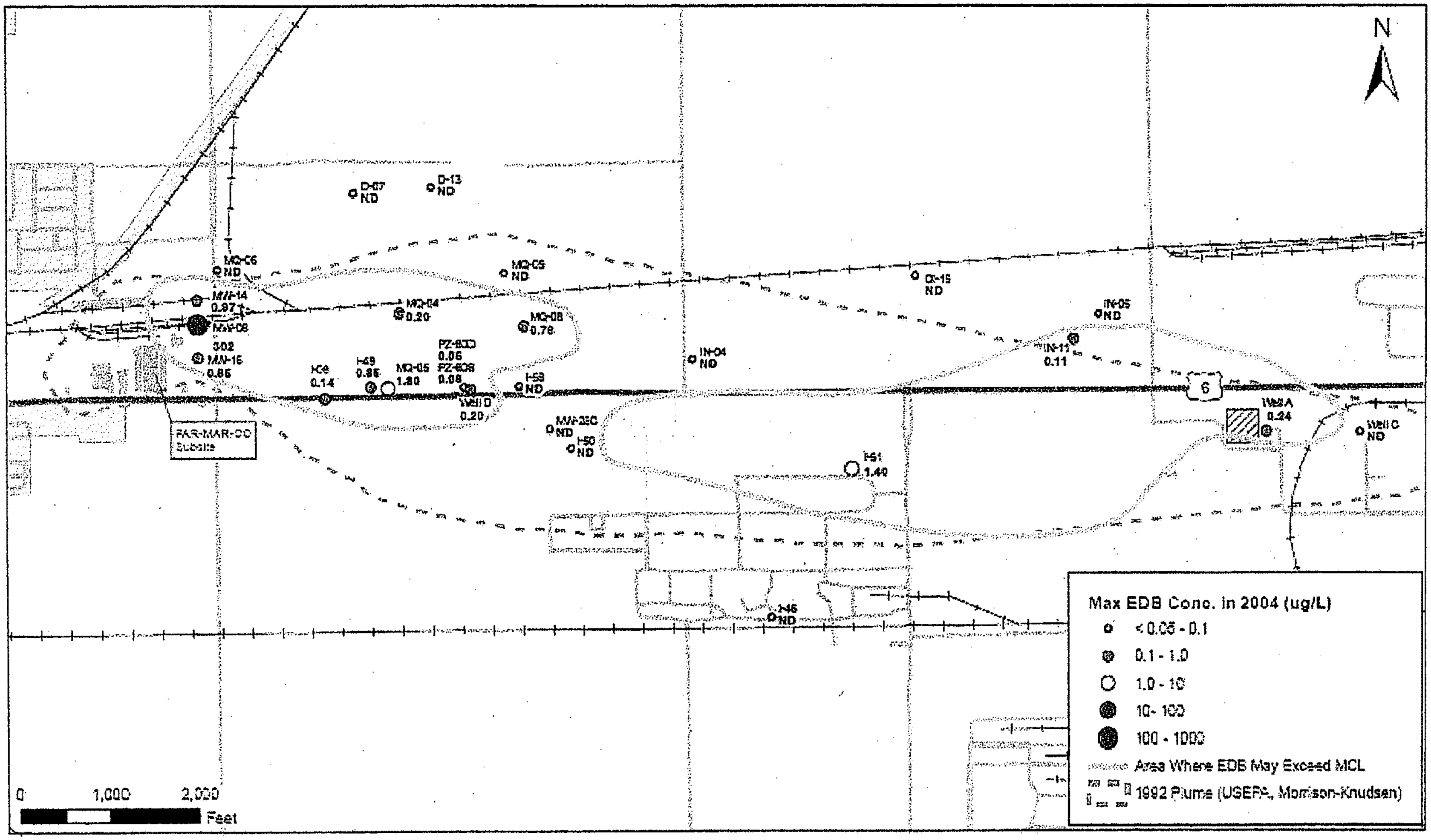


Figure 4 CT Contaminant Plume

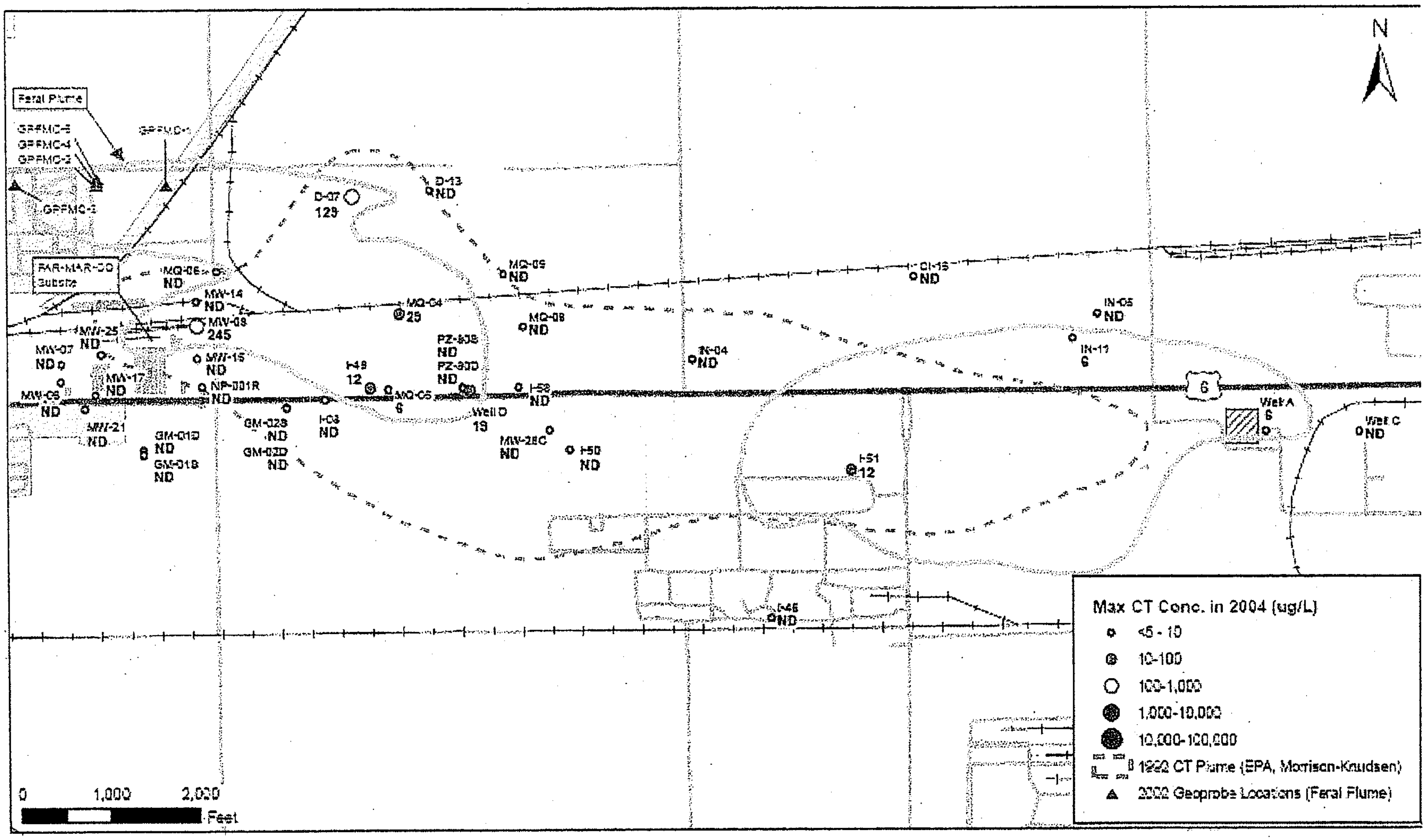


Table 1 Historic Concentrations of EDB and CT Observed in Wells in 2004, 2006, and 2007

Location	CT (µg/L)			EDB (µg/L)		
	2004	**2006**	**2007**	**2004**	**2006**	**2007**
CD-06	ND	ND	ND	0.02	ND	ND
CI-15	ND	ND	ND	ND	ND	ND
G-07D	ND	ND	ND	--	--	--
GM-01D	ND	ND	ND	--	--	--
GM-01S	ND	ND	ND	--	--	--
GM-02D	ND	ND	ND	--	--	--
GM-02S	ND	ND	ND	--	--	--
I-46	ND	ND	ND	1.2	ND	ND
I-49	12	ND	ND	.35	.64	.18
I-50	3.7	ND	ND	.02	ND	ND
I-51	12	7	ND	1.4	.21	.09
I-58	ND	ND	ND	ND	ND	ND
IN-04	ND	ND	ND	.02	ND	ND
IN-05	.52	ND	--	.04	ND	--
IN-11	11	8	--	.17	.08	--
MLW-1-1	ND	ND	ND	--	--	--
MLW-1-2	ND	ND	ND	--	--	--
MLW-1-3	ND	ND	ND	--	--	--
MLW-2-1	ND	ND	ND	--	--	--
MLW-2-2	ND	ND	ND	--	--	--
MLW-2-3	ND	ND	ND	--	--	--
MQ-04	29	26	17	.2	.25	.14
MQ-05	6	ND	ND	1.3	.58	.44
MQ-06	ND	ND	ND	ND	ND	ND
MQ-08	ND	ND	ND	.76	.29	.18
MQ-09	ND	ND	ND	ND	ND	ND
MW-06	ND	ND	ND	--	--	--
MW-07	ND	ND	ND	--	--	--
MW-08	245	219	190	302	2.3	.92

Table 1 Historic Concentrations of EDB and CT Observed in Wells in 2004, 2006, and 2007

Location	CT (µg/L)			EDB (µg/L)		
	2004	**2006**	**2007**	**2004**	**2006**	**2007**
MW-14	ND	ND	ND	.97	.45	.25
MW-16	ND	ND	ND	.85	.16	.14
MW-17	ND	ND	ND	--	--	--
MW-19	ND	ND	ND	--	--	--
MW-21	ND	ND	ND	--	--	--
MW-25	ND	ND	ND	--	--	--
MW-28R	ND	ND	ND	--	ND	ND
NP-001R	ND	ND	ND	--	--	--
PZ-80D	ND	--	ND	.05	--	--
PZ-80S	ND	--	ND	.06	--	--
Well A	6	7	ND	.24	.3	.19
Well C	ND	ND	ND	ND	ND	ND
Well D	19	6	ND	.2	.09	.07

Table 2 Summary of Toxicity Values Used

Chemical	Cancer Slope Factor (mg/kg-day)$^{-1}$		Reference Dose (mg/kg-day)	
	Oral	Inhalation	Oral	Inhalation
Ethylene Dibromide	20E+00	2.0E+00	9.0E-03	2.6E-02
Carbon Tetrachloride	1.3E-01	5.3E-02	7.0E-04	7.0E-04

Table 3 Potable Exposure Assumptions For OU6 Ground Water

Symbol-Definition	Default
Target Cancer Risk (unitless)	10^{-6}
Target Hazard Quotient (unitless)	1
Body Weight – adult (kg)	70
Body Weight – child (kg)	15
Averaging Time – cancer (days)	25,550
Averaging Time – noncancer (days)	Exposure Duration x365
Drinking Water Ingestion – adult (L/day)	2
Drinking Water Ingestion – child (L/day)	1
Ingestion Factor – water [(L-year)/(kg-day)]	1.1
Inhalation Rate – adult (m^3/day)	20
Inhalation Rate – child (m^3/day)	10
Inhalation Rate, air ([m^3-yr)/(kg-day)]	11
Exposure Frequency (days/year)	350
Exposure Duration – residential (yrs)	30
Exposure Duration – adult (yrs)	24
Exposure Duration – child (yrs)	6
Volatilization Factor for Water (L/m^3)	0.5
Cancer Slope Factor – oral $(mg/kg\text{-}day)^{-1}$	Chemical Specific
Cancer Slope Factor – inhalation $(mg/kg\text{-}day)^{-1}$	Chemical Specific
Reference dose – oral (mg/kg-day)	Chemical Specific
Reference dose – inhalation (mg/kg-day)	Chemical Specific

Table 4 OU 6 Ground Water: Comparison of Site Concentrations to Risk-Based Acceptable Concentrations

Chemical	Maximum Site Concentration (ppb)	Location (Boring #)	Risk-Based Concentration (ppb)	Max Site Exceeds Risk-Based?
Ethylene Dibromide	511	MW-14	0.0056	Yes
Carbon Tetrachloride	2,800	MW-8	0.017	Yes

Table 5 Applicable or Relevant and Appropriate Requirements (ARARs)

Statute or Regulation	Citation	Description	Comments
FEDERAL ACTION – SPECIFIC ARARs			
Safe Drinking Water Act	42 USC Sec 300 Pub. L. 99-339	Regulations and standards for public water systems, valuable aquifers and the underground injection of contaminants.	
Solid Waster Disposal Act	42 USC Sections 3251-3259; 6901-6987	Statutes designed to provide lifetime management of hazardous waste by imposing management requirements on generators and transporters of hazardous materials and upon owners and operators of treatment, storage, and disposal facilities.	Applicable or relevant and appropriate during construction of wells if drilling involves disposal of hazardous wastes.
Identification and Listing of Hazardous Wastes	40 CFR Part 260	Establishes procedure and criteria for modification or revocation of any permit.	May be applicable or relevant and appropriate if substances at the site are to be excluded from the list of hazardous wastes.
Standards Applicable to Generators of Hazardous Waste	40 CFR Part 262	Establishes standards for generators of hazardous waste.	Applicable if selected alternative involves treatment, storage or disposal of hazardous waste on-site, or transportation off-site.
Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities	40 CFR Part 264	Establishes minimum national standards that define the acceptable management of hazardous waste for owners and operators of facilities that treat, store, or dispose of hazardous waste.	Subparts B through O may be applicable or relevant and appropriate to on-site and off-site remedial actions.
Clean Air Act	42 USC Sections 7401-7642	Regulates emissions to protect human health and the environment. Enabling statute for major provisions such as National Ambient Air Quality Standards (NAAQS), National Emission Standards for Hazardous Air Pollutants (NESHAPS), and new source performance standards (NSPA).	
National Primary and Secondary Ambient Air Quality Standards	40 CFR Part 50	Establishes National Ambient Air Quality Standards for ambient air quality for treatment technology to protect public health and welfare.	Primary standards are applicable to any alternative emitting regulated pollutants, including contaminants discharged to the air during a treatment process.
Occupational Safety and Health Act	29 USC Sec 651-678	Regulates worker health and safety.	Applies to all response activities under NCP. Air emissions shall not result in work-place exposure to contaminants above permissible exposure limits (PELS).

Table 5 Applicable or Relevant and Appropriate Requirements (ARARs)

Statute or Regulation	Citation	Description	Comments
Clean Air Act	42 USC Sections 7401-7642	Regulates emissions to protect human health and the environment. Enabling statute for major provisions such as National Ambient Air Quality Standards (NAAQS), National Emission Standards for Hazardous Air Pollutants (NESHAPS), and new source performance standards (NSPA).	
National Primary and Secondary Ambient Air Quality Standards	40 CFR Part 50	Establishes National Ambient Air Quality Standards for ambient air quality for treatment technology to protect public health and welfare.	Primary standards are applicable to any alternative emitting regulated pollutants, including contaminants discharged to the air during a treatment process.
Occupational Safety and Health Act	29 USC Sec 651-678	Regulates worker health and safety.	Applies to all response activities under NCP. Air emissions shall not result in work-place exposure to contaminants above permissible exposure limits (PELS).
Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)	AOC for the FAR-MAR-CO subsite March 2005	Requires remediation of ground water to MCLs in area of attainment.	
STATE ACTION – SPECIFIC ARARs			
Nebraska Rules and Regulations Governing Hazardous Waste Management (administered by NDEQ)	Title 128	Establishes procedures for notification of hazardous waste activity, identification and listing of hazardous waste, generators, and operators of treatment, storage, and disposal facilities.	Treatment, storage, or disposal facilities built on-site would be required to meet the substantive requirements of this regulation. Off-site treatment, storage, or disposal facilities would be required to meet all requirements.
Nebraska Air Pollution Control Rules and Regulations (administered by NDEQ)	Title 129	Establishes primary and Secondary Ambient Air Quality Standards and requires operating permits for various operation emitting contaminants into the air.	Applicable when contaminants are discharged to the air during a treatment process.
Well Construction, Pump Installation, and Well Abandonment (administered by the NHHSS) and Well Registration (NDNR)	Title 178 and Title 456	Establishes standards for well construction and abandonment.	Applicable to monitoring and injection well construction.

Table 5 Applicable or Relevant and Appropriate Requirements (ARARs)

Statute or Regulation	Citation	Description	Comments
FEDERAL CHEMICAL – SPECIFIC ARARs			
Safe Drinking Water Act	42 USC Sec. 300 Pub. L. 99-339	Regulations and standards for public water systems, valuable aquifers and the underground injection of contaminants.	
National Primary Drinking Water Regulations	40 CFR Part 141 Subpart B	Establishes Maximum Contaminant Levels (MCLs) which are enforceable standards establishing maximum permissible levels of contaminants in drinking water from a public water system. MCLs are based on health considerations, technological feasibility, economic considerations, and the inclusion of a safety factor to protect sensitive populations.	MCLs are ARARs for any water that is considered a source or potential source of drinking water. MCLs are applicable at the tap when water is provided directly to 25 or more people or 15 or more service connections. Otherwise, MCLs are relevant and appropriate.
Clear Air Act	42 USC Sec. 7401-7642	Establishes standards for ambient air quality to protect public health and welfare.	Applicable when contaminants are discharged to the air during a treatment process.
STATE CHEMICAL – SPECIFIC ARARs			
Ground water Quality Standards and Use Classification (administered by NDEQ)	Title 118	Establishes standard and use classifications for ground water sources of drinking water. Determines priorities for ground water remedial actions.	Nebraska MCLs for the COCs are identical to Federal MCLs.
Nebraska Air Pollution Control Rules and Regulations	Title 129	Establishes primary and Secondary Ambient Air Quality Standards and requires operating permits for various operations emitting contaminants into the air.	Sources with potential to emit 2.5 tons per year of any one toxic air pollutant or 10 tons per year of any combination of toxic air pollutants are regulated under Title 129 and require best available control technology (BACT).

Table 6 Comparative Analysis of Alternatives

Table 6 **Comparative Analysis of Alternatives**

Evaluation Criteria	Alternative 1 No Action	Alternative 2 Ground Water Extraction at Well D, Treatment and Disposal at Industrial Facility	Alternative 3 Ground Water Extraction at Well D and at Well Near Source Zone, Treatment and Disposal at Industrial Facility	Alternative 4 Ground Water Extraction at Well D, Treatment and Disposal at Industrial Facility with Alternative Cleanup Standard	Alternative 5 Ground Water Extraction at Well D and Enhanced Bioremediation Near Source Zone
Overall Protection of Human Health and the Environment	Protectiveness would be similar to current conditions in the short term and would be protective in the long term. Alternative will prevent further degradation of ground water, but will involve longer times until achievement of MCLs for EDB and CT than active alternatives	Protectiveness would be similar to current conditions in the short term and would be protective in the long term. Alternative will prevent further degradation of ground water and reduce risks associated with exposure to ground water	Protectiveness would be similar to current conditions in the short term and would be protective in the long term. Alternative will prevent further degradation of ground water and reduce risks associated with exposure to ground water	Protectiveness would be similar to current conditions in the short term and would be protective in the long term. Alternative will prevent further degradation of ground water and reduce risks associated with exposure to ground water	Protectiveness would be similar to current conditions in the short term and would be protective in the long term. Alternative will prevent further degradation of ground water and reduce risks associated with exposure to ground water
Compliance with ARARs	Meet ARARs MCLs as relevant and appropriate requirements for aquifer restoration would be attained through natural attenuation and mass removal by existing industrial and irrigation wells	Meets ARARs MCLs are relevant and appropriate requirements for aquifer restoration will be attained in approximately 30-50 years in the attainment area. Extracted water for use as industrial process and cooling water will meet the requirements of the air-emission permit, federal Clean Air Act (42 USC 1857 et. Seq., and Nebraska Environmental Protection Act, Air Pollution Control Rules and Regulations (Chapter 81, Title 129)	Meets ARARs MCLs as relevant and appropriate requirements for aquifer restoration will be attained in approximately 30-50 years in the attainment area. Extracted water for use as non-contact cooling water will meet the requirements of the air-emission permit, federal Clean Air Act (42 USC 1857 et seq., and Nebraska Environmental Protection Act, Air Pollution Control Rules and Regulations (Chapter 81, Title 129)	Meets current ARARs Unless Technical Impracticability Determined See Alternative 2	Meets ARARs MCLs as relevant and appropriate requirements for aquifer restoration will be attained in approximately 30-50 years in the attainment area. Extracted water for use as non-contact cooling water will meet the requirements of the air-emission permit, federal Clean Air Act (42 USC 1857 et seq., and Nebraska Environmental Protection Act, Air Pollution Control Rulers and Regulations (Chapter 81, Title 129)

Table 6 **Comparative Analysis of Alternatives**

Evaluation Criteria	Alternative 1 No Action	Alternative 2 Ground Water Extraction at Well D, Treatment and Disposal at Industrial Facility	Alternative 3 Ground Water Extraction at Well D and at Well Near Source Zone, Treatment and Disposal at Industrial Facility	Alternative 4 Ground Water Extraction at Well D, Treatment and Disposal at Industrial Facility With Alternative Cleanup Standard	Alternative 5 Ground Water Extraction at Well D and Enhanced Bioremediation Near Source Zone
Long-Term Effectiveness	Effective for COCs There will be no risk of exposure to contaminants under institutional controls, and there will be no air emissions Contaminant concentrations in affected ground water will not be actively reduced, but will be passively reduced through natural attenuation and capture by industrial and irrigation wells.	Effective for COCs This remedy is already in place and operating. EDB and CT concentrations in affected ground water will be reduced and contaminated ground water will be prevented from migrating downgradient. Treatment of the water at the Whelan Energy Center will permanently remove contaminants form the extracted ground water.	Effective for COCs COC Concentrations will be reduced closer to the source and contaminated ground water will be prevented from migrating downgradient. Treatment of the extracted ground water at the Whelan Energy Center will permanently remove contaminants from the extracted ground water.	Effective for COCs This remedy is already in place and operating. COC concentrations in affected ground water will be reduced and contaminate ground water will be prevented from migrating downgradient. Treatment of the water at the Whelan Energy Center will permanently remove contaminants form the extracted ground water.	Effective for COCs COC concentrations will be reduced closer to the source and contaminated ground water will be prevented from migrating downgradient. Treatment of the extracted ground water at the Whelan Energy Center will permanently remove contaminants from the extracted ground water.
Reduction of Mobility, Toxicity, and Volume	No active reduction in mobility, toxicity, or volume There will be no treatment, however, natural attenuation and pumping by irrigation and industrial wells will reduce the volume and toxicity of contaminants in ground water	Effective Extraction and treatment will permanently reduce the volume of EDB– and CT–contaminated ground water and reduce or eliminate plume mobility. The effects of treatment (removal of ground water and evaporation of VOCs) are irreversible	Effective Extraction and treatment will permanently reduce the volume of EDB– and CT–contaminated ground water. The addition of a well near the source will further reduce the mass of EDB, but not CT. The effects of treatment (removal of ground water and evaporation of VOCs) are irreversible	Effective Extraction and treatment will permanently reduce the volume of EDB– and CT–contaminated ground water and reduce or eliminate plume mobility. The effects of treatment (removal of ground water and evaporation of VOCs) are irreversible	Effective Extraction and treatment will permanently reduce the volume of EDB– and CT–contaminated ground water. The effects of treatment (removal of ground water and evaporation of VOCs) are irreversible

Table 6 **Comparative Analysis of Alternatives**

Evaluation Criteria	Alternative 1 No Action	Alternative 2 Ground Water Extraction at Well D, Treatment and Disposal at Industrial Facility	Alternative 3 Ground Water Extraction at Well D and at Well Near Source Zone, Treatment and Disposal at Industrial Facility	Alternative 4 Ground Water Extraction at Well D, Treatment and Disposal at Industrial Facility with Alternative Cleanup Standard	Alternative 5 Ground Water Extraction at Well D and Enhanced Bioremediation Near Source Zone
Short-Term Effectiveness	Effective As long as the institutional controls are in place and regional pumping remains unchanged, there is no short-term risk of exposure to contaminants.	Effective This remedy is already in place and operating effectively, short-term effectiveness is unchanged.	Effective This remedy is an amendment to the remedy already in place and operating effectively. In the short term, EDB concentrations in affected ground water will be reduced closer to the source.	Effective This remedy is already in place and operating effectively, short-term effectiveness is unchanged.	Effective This remedy is an amendment to the remedy already in place and operating effectively. In the short term, EDB concentrations in affected ground water will be reduced closer to the source.
Implementability	Readily Implementabled	Implementable This remedy is already implemented as the interim remedy	Readily Implementable This remedy is readily implemental, a single extraction well needs to be installed and connected to the existing delivery pipeline for the interim remedy	Implementable This remedy is already implemented as the interim remedy	Readily Implementable This remedy is readily implementable, a single extraction well needs to be installed for nutrient enhancement; existing monitoring wells can be used to monitor treatment
Cost (net present value, 7%, 20 years)	Minimal Capital costs only for discontinuing interim remedy	Medium	High	Medium	High See Table 7

Table 7 Cost Estimate For Selected Remedy

ITEM	UNIT	UNIT QUANTITY	UNIT COST ($)	TOTAL COST ($)
CAPITAL COSTS				
Treatment Equipment	LS	1	$ 40,000.00	$ 40,000.00
Design & Construction O/S	LS	1	$ 47,800.00	$ 47,800.00
			Subtotal	$ 87,800.00
Other Costs				
Project Management (5%)			$ 4,390.00	$ 4,390.00
Contingency (15% of Subtotal)			$ 13,170.00	$ 13,170.00
Total				$ 105,360.00
O&M				
Annual Costs	LS	1	$ 135,593.00	$ 135,593.00
20-Year O&M (Present Value)	LS	1	$1,091,798.00	$1,091,798.00
Total 20-Year Costs (Capital Costs + O&M P.V.)	LS	1	$1,197,158.00	$1,197,158.00

RECORD OF DECISION

RESPONSIVENESS SUMMARY

HASTINGS GROUNDWATER CONTAMINATION SITE
FAR-MAR-CO SUBSITE
HASTINGS, NEBRASKA

PREPARED BY:

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION VII
KANSAS CITY, KANSAS

SEPTEMBER 2007

RESPONSIVENESS SUMMARY

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RESPONSIVENESS SUMMARY
HASTINGS GROUNDWATER CONTAMINATION SITE
FAR-MAR-CO SUBSITE
HASTINGS, NEBRASKA

1. OVERVIEW

The U.S. Environmental Protection Agency (EPA), with concurrence from the Nebraska Department of Environmental Quality (NDEQ), presented the preferred remedial alternative in the Proposed Plan on July 9, 2007, for public comment. The preferred remedial alternative addressed contaminated ground water for Operable Unit 6 (OU 6) of the Hastings FAR-MAR-CO Subsite (Subsite). The treatment technologies included within the preferred alternative were: (1) enhanced in-situ bioremediation of the contaminant hot spot; and (2) extraction and use of contaminated ground water as non-contact cooling water.

EPA conducted a public meeting to present the Proposed Plan, discuss the preferred alternative, and answer questions presented by the public, on July 18, 2007. Members of the general public, city officials, and a representative of the potentially responsible party attended. EPA only received one question at the time of the public meeting.

EPA received written comments from one party: S.S. Papadopulos & Associates, Inc. (SSPA), the consultant for PRP Morrison Enterprises.

2. BACKGROUND ON COMMUNITY INVOLVEMENT

The Feasibility Study (FS) and the Proposed Plan for OU 6 were released to the public on July 9, 2007. The Administrative Record (which includes numerous remedial investigation documents, the FS report, and the Proposed Plan) was made available for public review at the information repositories maintained at the Hastings Public Library and at the EPA Region 7 office in Kansas City, Kansas. The notice of availability of the Administrative Record was published in The Hastings Tribune on July 9, 2007. The public comment period on the Proposed Plan ran for 30 days from July 9 to August 9, 2007.

A public meeting was held by EPA and the NDEQ on July 18, 2007, in the Hastings Public Library. Letters were sent to citizens of Hastings advertising the meeting. Interested citizens were given the opportunity to hear a summary of the Proposed Plan and to provide comments or ask questions concerning the investigations or remedial alternatives. A transcript of the public meeting was made. At this meeting EPA and NDEQ representatives answered one question about problems at the Subsite and the Superfund remedial process.

3. SUMMARY OF COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD

3.1 Oral Comments Received during the Public Meeting

One comment was received during the public meeting. A transcript of the meeting, which included a question and answer period, is part of the Administrative Record.

3.2 Written Comments Received

3.2.1 From Interested Citizens

None received.

3.2.2 From PRPs

One letter was received in which SSPA, on behalf of Morrison Enterprises (Morrison), provided the following comments:

1. In general, Morrison prefers Alternative 2, and disagrees with EPA's selection of Alternative 5 in the Proposed Plan, because "Alternative 5 requires the expenditure of additional resources upon remedial measures west of Well D that will have little incremental impact upon the time to reach ultimate cleanup of the aquifer, or potability of the ground water resource". While Morrison agrees that Alternative 5 will be beneficial in removing ethylene dibromide (EDB) and carbon tetrachloride (CT) in the ground water west of Well D, Morrison does not favor it and provides the following reasons:

    - The additional source area remediation would remove contamination which would otherwise be captured by Well D.
    - There is no risk pathway elimination, because potential risk pathways are currently mitigated by the Institutional Control Area (ICA) and the current capture systems.
    - Even if the additional measures resulted in complete removal of all FAR-MAR-CO-related ground water contamination, they would not address trichloroethene (TCE) and other contaminants from upgradient sources, or CT from the feral plume, so potable water will not result.
    - The additional measures will reduce the mass of EDB and CT in the aquifer west of Well D, but not the greater mass of these contaminants in the ground water east of Well D, within the capture zones of the secondary and tertiary extraction system.

2. Morrison comments that the Proposed Plan is misleading because it suggests that EDB and CT represent the only, or primary risks from ground water contamination, when in fact, TCE from upgradient sources is present in the ground water at concentrations several orders of magnitude greater than EDB or CT. Removal of EDB and CT would not eliminate the risk associated with the remaining TCE.

3. Morrison comments that the Proposed Plan's characterization of potential risk associated with potable use of ground water or inhalation of contaminants is unrealistic, because the Subsite lies within the ICA (in which domestic or public use of ground water is prohibited), and because ground water is at great depth (100 to 120 feet below the surface), making the risk of inhalation minimal at best.

4. Morrison comments that the time required for remediation of overall ground water contamination will not be strongly impacted by employment of Alternative 5, relative to Alternative 2, because Alternative 5 does not address non-FAR-MAR-CO ground water contamination which impacts the same geographic area. As a consequence, the ground water will still not meet the remedial action objectives, which are the drinking water Maximum Contaminant Levels (MCLs). Continued operation of Well D and the other extraction wells (Alternative 2) will allow CT and EDB to ultimately reach their MCLs.

Response

1. Morrison comments that Alternative 2 is preferable as Well D will capture the source contamination. EPA agrees that Alternative 2 may capture source contamination but considers implementation of Alternative 5 to be preferable because (a) based on SSPA's model, the source contamination will be captured sooner, and (b) Well D may not capture all the source contamination. EPA considers the cutoff of source area contamination as an important component of the selected remedy as it will result in greater long-term effectiveness of the remedy and will help retard continued movement of the contaminants of concern (COCs) away from the source area. EPA considers source control as an important and necessary component of all remedies.

   EPA recognizes that Alternative 2 would provide for effective reduction in the volume and mass of contaminants due to extraction of ground water at Well D and the other extraction wells, and treatment of that water through use as non-contact cooling water. However, EPA prefers Alternative 5 because it achieves the remedial action objectives sooner than Alternative 2 would. Moreover, state acceptance of Alternative 5 as the selected remedy is greater as a result of its more comprehensive approach to ground water remediation.

2. Morrison comments that the Proposed Plan is misleading because it overlooks the importance of TCE contamination with regard to risk at the Subsite. EPA disagrees. EPA has not ignored the risk posed by the presence of TCE, but because it emanates from an upgradient source, EPA addressed the risk posed by TCE in the August 2006 ROD for the North Landfill Subsite, which is an upgradient source of TCE. EPA's characterization of risk in the Proposed Plan for the FAR-MAR-CO Subsite pertains to the contaminants which emanated from the FAR-MAR-CO Subsite -- CT and EDB.

   The preferred alternative in the Proposed Plan will reduce the levels of the COCs to MCLs. In the process of implementing the remedial action for the FAR-MAR-CO Subsite, concentrations of TCE will also be reduced. (The ROD for the North Landfill Subsite, an upgradient source of TCE, selects a remedy that reduces TCE to MCLs.) The presence of contaminants not associated with OU 6 does not bear on the identification and implementation of the remedy for OU 6. The CT and EDB contamination must be addressed in the manner which most adequately satisfies the nine evaluation criteria employed in the Proposed Plan process.

3. Morrison comments on EPA's risk characterization and implies that the selected remedy is not needed because the ICA eliminates potential risk pathways. EPA agrees that the ICA provides a beneficial control. It was put in place to address risk associated with potential exposure to ground water area. It was established under the Area-Wide Consent Decree for the Hastings Groundwater Contamination Site. Under this arrangement, the city of Hastings has enacted an ordinance which restricts the installation of wells within the ICA. It does not, as SSPA has characterized, prohibit domestic or public use of ground water. In the interest of evaluating potential risk, EPA assumed that, despite precautions otherwise taken, a drinking water well could be placed into the affected area in the future.

   EPA recognizes that inhalation of ground water contaminants which volatilize and migrate up through the soils into buildings constructed above the FAR-MAR-CO plume may seem like a remote possibility under current circumstances. It is reasonable, given the standard procedural protocols, to assume for the purposes of characterizing risk that inhalation of contaminant vapors may be a possibility.

4. Morrison comments that overall ground water contamination, and the time required to remedy it, will not be strongly affected by Alternative 5, relative to Alternative 2, because Alternative 5 does not address contamination from upgradient sources. EPA believes that, whenever possible, contaminants should be removed from an aquifer regardless of whether there are other contaminants present. In this case, as noted above, the FAR-MAR-CO contaminant plume is proximate to plumes originating upgradient of the Subsite, as well as the feral plume. There are sufficient concentrations present which can be removed from the aquifer; therefore, every effort should be made to remove those contaminants. So long as the selected remedy is not adversely affected, the presence of contaminants not associated with a given OU does not bear on the identification and implementation of the remedy for that OU. The contamination associated with the FAR-MAR-CO Subsite must be addressed in the manner which most adequately satisfies the nine evaluation criteria, as required by the NCP.

   Based on SSPA's modeling, it would appear that employment of Alternative 5 will result in ground water contaminant cleanup approximately ten percent faster than employment of Alternative 2. It is conceivable that a pilot-scale treatability study will reveal a greater acceleration of cleanup resulting from Alternative 5. SSPA's June 2007 Addendum to the Feasibility Study (FS) indicates that active operations associated with enhanced in-situ bioremediation will take only about 3 years, early in the life-cycle of the overall remedial process. In contrast, it has been estimated that all ground water contamination from the North Landfill west of Well D will have reached Well D by 2017. Investigation and cleanup activities associated with the Colorado Avenue plume are ongoing. Opportunities to accelerate the cleanup of all of the ground water contamination should be taken when available.

3.2.3 From Other Interested Parties

None received.